

Section II. (Remarks)**Rejection of Claims 1-30 under 35 U.S.C. §102(b), and Traversal Thereof**

In the May 31, 2005 Office Action, the Examiner rejected claims 1-30 under 35 U.S.C. §102(b) as being anticipated by Chen et al. U.S. Patent No. 5,350,336 (hereinafter Chen). Applicants traverse such rejection, and respectfully request reconsideration of claims 1-30 pending in the application, based on the ensuing remarks.

Patentable Distinction of Claims as Amended/Added, Over the Cited References

The pending claims 1-30 have been rejected as anticipated by Chen.

"Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W.L. Gore & Assocs. v. Garlock*, 721, F.2d 1540, 220 USPQ 303 at 313 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). It is not enough that the prior art reference disclose all the claimed elements in isolation. Rather, "anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim." *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added). Further, "[u]nder 35 U.S.C. § 102, anticipation requires that ... the prior art reference must be enabling, thus placing the allegedly disclosed matter in the possession of the public." *Akzo, N.V. v. United States Int'l Trade Comm'n*, 808 F.2d 1471, 1 USPQ2d 1241, 1245 (Fed. Cir. 1986).

Chen, however, fails to teach or suggest a semiconductor manufacturing process facility "wherein air exhaust is flowed through a discrete volumetric region of said clean room, said facility comprising an air exhaust treatment apparatus arranged to (i) receive air exhaust after flow thereof through said discrete volumetric region of said clean room, (ii) produce a treated air exhaust, and (iii) recirculate the treated air exhaust to an ambient air environment of the facility," as required by applicants' independent apparatus claim 1, and correspondingly recited in applicants' independent method claim 14.

In this respect, the examiner's attention is directed to applicants' specification, at page 4, paragraph [0011] thereof, as imparting a specific meaning to the term "air exhaust:"

"[0011] The heat/general exhaust in the semiconductor manufacturing plant or other process facility hereinafter is referred to as "air exhaust" and denotes an air stream that is flowed through process tool housings, cabinets, fume regions, abatement units, containment enclosures, and other discrete volumetric regions within the plant, for example, as (i) a "sweep gas" to shroud, transport or dilute contaminants that pose a health, safety, or environmental risk to persons and/or processes in the plant, and/or (ii) a convective heat transfer medium, to remove heat from equipment (e.g., fab tools such as ion implanters, vaporizers and vapor deposition reactors, plasma generators, etc.), regions and/or other process streams associated with semiconductor manufacturing operation."

The air exhaust treatment that is required in applicants' claimed invention is identified at page 9, paragraph [0023] of the specification:

"[0023] The air exhaust treatment apparatus can be of any suitable type that is effective to purify the air exhaust of contaminants, e.g., toxic, hazardous or otherwise undesirable gases, and produce a treated air exhaust suitable for recirculation within the semiconductor manufacturing facility. The air exhaust treatment apparatus can for example include a chemical filter that includes a suitable chemisorbent or physical sorbent material having sorptive affinity for the gas species desired to be removed from the air exhaust in the purification thereof."

The "air exhaust" and "air exhaust treatment" specified in the claims therefore have particular meanings as used by applicants.

It is well-established that a patent applicant may be his own lexicographer, so long as (1) the meaning assigned to a term is not repugnant to its well-known usage, and (2) the special meaning is "sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention." *Multiform Dessicants Inc. v. Medzam Ltd.*, 133 F.3d 1473, 1477, 45 USPQ2d 1429, 1432 (Fed. Cir. 1998); M.P.E.P. 2111.02.

In contrast to the air exhaust treatment and recirculation to an ambient air environment of the semiconductor manufacturing process facility, as required by applicants' broad claims, Chen fails to disclose any such air exhaust treatment and recirculation.

More specifically, Chen fails to provide a competent disclosure. At column 4, lines 4-8, Chen discloses that:

"Referring now to FIG. 1 there is illustrated a building for housing a manufacturing line, that includes a clean environment for manufacturing integrated circuit semiconductor devices that is known to the prior art. This Prior Art is U.S. Pat. No. 5,059,491 K. C. Wiemer et al."

In the disclosure after such quoted text, Chen discusses the air/gas handling system, including the textual passages referenced by the examiner in his statement of rejection (column 4, line 34; column 4, lines 36-40; and column 4, lines 51-56), and then follows at the top of column 5 with the statement that:

"The operation of the localized Class 1 or below clean room system may be more fully understood with reference to PRIOR ART FIG. 1. This Prior Art is U.S. Pat. No. 5,059,491 K. C. Wiemer et al."

Thus, Chen teaches a semiconductor manufacturing facility that is as described in "U.S. Pat. No. 5,059,491 K. C. Wiemer et al." In fact, US Patent 5,059,491 is not issued to Wiemer et al., but is issued to Niro Odani, et al. for "CERMET BLADE MEMBER FOR CUTTING-TOOLS AND PROCESS FOR PRODUCING SAME," which has no relationship or supportive disclosure whatsoever. A copy of the face page of US Patent 5,059,491 is attached in Appendix A thereof, as substantiation of this lack of relevant disclosure in Chen.

The discussion of the air/gas handling system in Chen is equally deficient in providing any anticipatory basis of applicants' claimed invention.

The examiner at page 2 of the Office Action has stated that in Chen, "air exhaust is flowed through a clean room (12 in Fig. 1, col. 4, lines 51-56)." In fact, the reference 12 in Fig. 1 of Chen is not an air exhaust or a clean room, but is an unspecified piece of the processing equipment for semiconductor wafer fabrication.

Further, the passage referred to by the examiner at column 4, lines 51-56 references numerically identified elements that are not in fact present in the referenced Fig. 1 drawing or in any of the other drawings or disclosure in the Chen patent:

“The toxic gases from trench 40 are moved into appropriate scrubbers 41 and other air purifying equipment (not shown) for cleaning and the resulting highly purified air is exhausted. The general air from trench 38 is moved via fan units directly to the atmosphere.”

There are no scrubbers 41, or any other structure or elements whatsoever that are labeled with the number 41 in Fig. 1 of Chen. The trench 40, as shown in the Chen Fig. 1 drawing reproduced below for ease of reference¹, is only shown connected to the vertical header 42, which in turn is connected to the ringed branch header 36; column 4, lines 49-51 of Chen discloses that “[v]ertical headers 42 allow the flow of the toxic gases from the ringed headers 36 to the toxic gas trench 40.” Thus, rather than being a source for any gases that are recirculated, the trench 40 appears to be a repository for toxic gases that are scrubbed/purified and “exhausted” from the system. There is no teaching or basis whatsoever for inferring, or extrapolating to, any recirculation of gas.

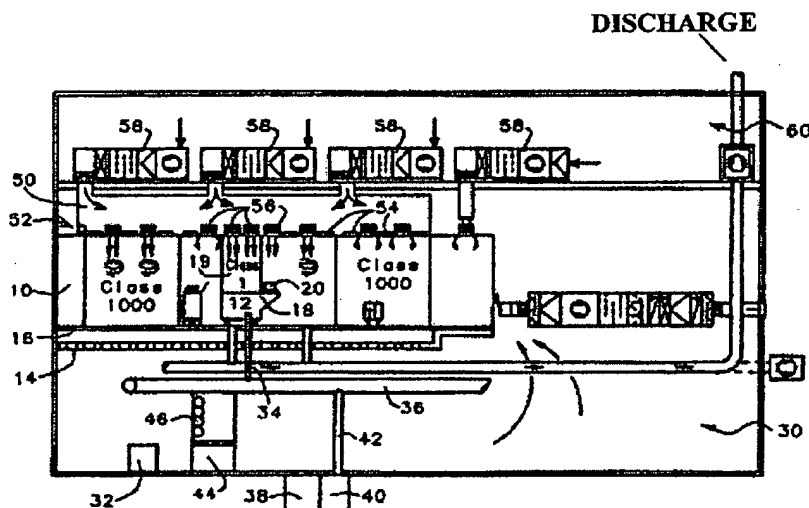


Fig. 1 of Chen

Chen is equally confusing about the handling of the “the general air in the air/gas flow within the building” (column 4, lines 45-46). Chen discloses at column 4, lines 54-56 that “[t]he general air

¹ As modified by the legend “DISCHARGE” and a connecting line, showing the effluent discharge conduit of the semiconductor manufacturing facility, as described more fully hereinafter.

from trench 38 is moved by a fan units directly to the atmosphere.” It is seen from an inspection of Fig. 1 above that such drawing shows trench 38, as unconnected to any fan, passage or other structure. Nonetheless, such disclosure states that the general air is “moved ... directly to the atmosphere,” thereby rebutting any construction of the patent as disclosing recirculation of such air.

The Office Action at page 2 thereof attributes to Chen a teaching of “the facility [of Chen] comprising an air exhaust treatment apparatus arranged to receive air exhaust after flow thereof through the clean room and produce a treated air exhaust and recirculate the treated air exhaust to the ambient air environment,” citing column 5, lines 8-18 of Chen. Chen in this cited passage, however, fails to teach such arrangement:

“The processing equipment 12 that is open to the wafers wherein the integrated circuits are being fabricated are only exposed to Class 1 air that is moving through the enclosure 19 in a laminar flow condition. The flow is typically 0.45 meters/sec. The enclosure 19 is a simple box-like structure made of rigid plastic panels with metal supports that has the function of isolating the clean air of Class 1 or below from the surrounding areas of a higher class of clean air such as Class 1000. The air flow in the Class 1000 areas are typically 0.1 meters/sec.” (Chen, column 5, lines 8-18).

This arrangement does not involve air exhaust treatment and recirculation. As shown in Fig. 1 of Chen, reproduced on the preceding page, the air flow through the enclosure 19 passes through the wafer processing equipment 12 and then flows down to either the ringed branch header 36, from which it flows into trench 40 as previously described hereinabove, or else it flows into the conduit that has been identified by the legend “DISCHARGE” in the reproduction of the Fig. 1 drawing on the preceding page, with the gas flow arrows in the flow conduit indicating that the gas is being flowed out of the manufacturing facility.

Neither of such dispositions of the air flow through enclosure 19 involves recirculation – the flow of the gas into the trench 40 is disclosed as being cleaned/purified and “exhausted” from the semiconductor manufacturing facility (see preceding discussion of the column 4, lines 51-56 of Chen), and the flow of gas from the enclosure 19 into the “DISCHARGE” conduit passes out of the semiconductor manufacturing facility. Neither gas stream is recirculated.

The examiner in his statement of rejection at page 2 of the Office Action further refers to Chen as teaching "[t]he exhaust treatment apparatus comprising a chemical filter to remove contaminant species therefrom and an air filter to remove particulate material therefrom," citing column 5, lines 33-61 and column 7, lines 12-18 of Chen.

This statement is incorrect. Lines 44-50 at column 5 of Chen disclose that:

"The filter 56 includes a filter structure that removes particulate contamination. The preferred filter structure is a metal or wooden treated frame with a totally sealed paper pleated packing. The specification must meet or exceed U.S. 209d Federal Standards. Such a filter is manufactured by Solfiltra Company in France."

What Chen teaches, therefore, is not a chemical filter, but a simple particle filter, having as the filtration element thereof a "paper pleated packing."

Further, the cited passages of Chen, at column 5, lines 33-61 and column 7, lines 12-18 of such reference, do not in any way teach air exhaust treatment and recirculation.

Instead, the first passage (at column 5, lines 33-61 of Chen) discloses an air handling system in which air is filtered of particles and thereafter,

"[t]he air passing through the processing equipment 12 picks up some toxic gases in some of the pieces of equipment. The exhaust of the air/gas moves into the air/gas handling system that includes the exhaust pipes 34 and the Multiple ringed branch headers 36. The treatment of this exhaust toxic gas was considered above." (column 5, lines 56-61 of Chen).

As previously pointed out herein, the gases entering exhaust pipes 34 and the multiple ringed branch headers 36, are exhausted from the semiconductor manufacturing facility without recirculation.

Likewise, the second passage (at column 7, lines 12-18 of Chen) does not teach air exhaust treatment and recirculation. Column 7, lines 12-18 of Chen is reproduced below, in elaboration of this point:

"Exhaust lines and drains must be provided to remove various fumes and gases from process equipment and from

hoods etc. Exhaust lines must also be provided to remove various corrosive liquids and solvents for treatment and disposal. Line 120 exhausts solvents, and lines 121 and 122 exhaust scrubbed and general gases, respectively. Ammonia (NH_3) is exhausted through line 138." (column 7, lines 12-18 of Chen)

There is no basis whatsoever in this passage for inferring any air exhaust treatment and recirculation operation.

Contrariwise, "[e]xhaust lines" are described as being used for "treatment and disposal." Chen's teaching of "disposal" is conceptually opposite to any notion of recirculation/re-use. Likewise, the reference to lines 121 and 122 as functioning to "exhaust scrubbed and general gases, respectively," provides no evidence of recirculation, and in fact, the reference to scrubbed and general gases logically connects such disclosure to the description at column 4, lines 51-56 of Chen, in which the scrubbed gas is taught to be "exhausted" (column 4, line 54) and the general gas (air) is taught to be "moved... directly to the atmosphere" (column 4, lines 55-56).

The examiner has further cited Chen as "teach[ing] a heat exchanger (col. 4, line 34) in the exhaust treatment apparatus to cool air exhausted flowed [sic] therethrough (col. 6, line 60 through col. 7, line 5)." In fact, the passage in Chen at column 4, lines 33-35,

"This type of equipment 32 would include motors, blowers, power supplies, heat exchangers, chemical transfer cabinets, etc."

refers to the schematically represented "box" in the Fig. 1 drawing of Chen, and as already pointed out hereinabove, the air passing through the processing equipment unit 12 is exhausted from the semiconductor manufacturing facility, without recirculation, so that the presence of a heat exchanger, per se, does not change the fact that Chen lacks disclosure of any air exhaust treatment and recirculation operation.

Likewise, the disclosure in Chen at column 6, line 60 through column 7, line 5 fails to provide any basis for an air exhaust treatment and recirculation operation:

"Referring now to FIGS. 5a and 5b there is depicted a portion of the lower floor showing various supply lines,

exhaust lines, electrical sources and other elements.

The supply and exhaust lines necessary to service a semiconductor manufacturing line are quite extensive. Various supply lines are needed to provide water to the processing equipment. Supply line 107 provides process cooling water. Demineralized water is supplied by line 109 in the initial stages of production, and after expansion by line 111. Soft water is supplied through line 119. Returns for these supply lines are also shown - line 110 is the return for demineralized water in the initial manufacturing stage, and line 112 in the final stages. Lines 103 and 118 provide returns for process cooling water."

The presence of flow lines for process water, cooling water, demineralized water, and soft water, do not in any way equate, analogize or extrapolate to any air exhaust treatment and recirculation operation, and thus does not raise Chen to the status of an anticipatory reference.

Finally, the examiner has stated that:

"Chen et al. further teach at least one semiconductor manufacturing tool including an ion implanter (see 24 in Fig. 3), and chemical filter comprising chemisorbent, which is chemically reactive with at least one gas species selected from the group consisting of hydrides, halides, acid gases and organometallic reagents (see col. 7, lines 47-65)" (page 3, May 31, 2005 Office Action).

In fact, the element numbered 24 in Fig. 3 of Chen is not a manufacturing tool or an ion implanter, but rather is a "tunnel," as referenced for example at column 6, lines 21-22 of Chen:

"In FIGS. 3 and 4 the tunnels 24 are indicated in both solid lines and dotted lines."

More important, however, is the fact that the cited passage of Chen at column 7, lines 47-65, reproduced below for ease of reference, contains no teaching of chemical filtration, chemisorption or chemical reaction for removal of hydrides, halides, acid gases or organometallic reagents:

process tunnel	fluid connections	exhaust connections	
Oxidation	O ₂ , N ₂ , cooling water, D.I. water	General exhaust, scrubber exhaust	50
Diffusion	O ₂ , N ₂ , cooling water, chemical, D.I. water	General exhaust, scrubber exhaust	
LPCVD	N ₂ , H ₂ , SiH ₄ , Ph ₃ , etc., cooling water	General exhaust, scrubber exhaust	55
Resist remove	chemical, D.I. water, solvent	General exhaust, scrubber exhaust	
Etch	Cl ₂ , HBr, CF ₄ , N ₂ , etc.	Scrubber exhaust	60
Implant	cooling water, N ₂ , CDA	General exhaust, scrubber exhaust	
Metal	cooling water, Ar, WF ₆ , NP ₃	General exhaust, scrubber exhaust	
Thin film	SiH ₄ , NH ₃ , N ₂ , etc.	General exhaust, scrubber exhaust	
Photo area	N ₂ , CDA, H ₂	General exhaust, solvent exhaust	65

Instead, the cited passage of Chen reproduced above describes the unit operations of the semiconductor manufacturing facility that are carried out in the respective process tunnels, together with the fluid connections for fluids of various types, and exhaust connections, specified as either "General exhaust" or "scrubber exhaust" or "solvent exhaust." None of such tabulated information in any way even remotely suggests the presence or use of a chemical filter comprising chemisorbent.

More importantly, however, such cited passage does not in any way provide any basis for applicants' claimed apparatus and method involving air exhaust treatment and recirculation, as claimed in independent apparatus claim 1 and claims 2-13 and 24-30 dependent thereunder, and as claimed in independent method claim 14, and claims 15-23 dependent thereunder.

It therefore is respectfully requested that the examiner reconsider and withdraw the rejection of claims 1-30 in light of the foregoing remarks, since it is clear that Chen fails to provide any descriptive or derivative basis for applicants' claimed invention.

CONCLUSION

Claims 1-30 are patentably distinguished over the art and in form and condition for allowance. Favorable action therefore is requested.

If any issues remain, incident to the allowance of the application, the examiner is requested to contact the undersigned attorney at (919) 419-9350 to discuss their resolution, in order that the application can be passed to issue at an early date.

Respectfully submitted,



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